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EXTENSION

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Clean-opening container and corresponding cap

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GK/DD

Clean-opening container and corresponding cap

Insert 1

The present invention relates to the field of containers intended to contain a certain amount of liquid while at the same time keeping some of their internal volume filled with gas.

Such containers are generally equipped with stoppering caps. When the cap is opened, some of the liquid nearby, for example a drop held by capillarity near the cap, may be splashed out of the container if there is an imbalance between the pressure inside said container and the ambient pressure outside. There is then the risk of the liquid spreading out near the opening of the container, or even of being splashed onto the user's hands or clothing. This drawback adopts even greater significance when the liquid is liable to stain, which is particularly the situation in the case of the packaging of products for dyeing hair.

In this respect, document EP-A-0 528 707 is known and proposes a two-bottle packaging for storing two products, particularly liquid products, separately from one another and mixing them at the time of their use. This packaging is designed for the separate storage of, on the one hand, a dye solution intended for dyeing the hair and, on the other hand, the oxidizing agent needed for using the dye solution. To dye hair with "oxidation dyes", it is actually necessary to develop the dye on the hair by adding an oxidizing agent, for example hydrogen peroxide, to the dye at the time when it is on the hair. Packaging in two bottles therefore makes the practice of coloring the hair much easier.

Before opening, the user mixes the solution of dye and oxidizing agent and generally shakes the

packaging to improve this mixing. An oxidation chemical reaction begins and causes the evolution of gas, particularly oxygen, which tends to increase the pressure inside the packaging. At the top of the bottle, there is a threaded male adaptor onto which a closed dispensing nozzle can be tightly screwed, and the tip of which can be broken off to create an opening at the time of use so that the product can be poured out onto the hair. This break-off tip prevents the user from re-stoppering the container through reuse of said tip, this being desirable insofar as the oxidation dye does not keep after mixing. The user is therefore encouraged to dispose of the packaging after first use of the dye.

However, it has been found that a drop of dye generally lies in close proximity to the break-off tip at the time of opening because the internal end of the dispensing nozzle is of pointed shape and tends to hold onto a drop of dye by capillarity and the user has generally shaken the packaging and caused this drop to form. Thus, when the user breaks off the tip to open the packaging, the drop in close proximity carries the risk of being splashed onto a surface outside the packaging, onto the user's hands or, worse still, onto the latter's clothing of which it may cause permanent staining. This phenomenon is all the more pronounced if the user has mixed the two constituents of the dye a certain while before opening, for example if he has washed his hair in-between these two operations. This is because the chemical reaction between the two constituents will then have caused a rise in pressure and hence a greater pressure differential between the inside of the packaging and the ambient atmosphere at the time of opening.

Furthermore, it has been found that the breakable stoppering means, which have very good hygienic properties, are not always easy to employ and to use. This is because if their mechanical properties are too

good, the user will tend to use a cutting blade or a pair of scissors to break off the tip, with a potential risk of injury and more complex opening. On the other hand, if the mechanical properties of the break-off tip are poor, the tip may break off accidentally during the handling to which the packaging is subjected, such as operations of wrapping, stacking or transport. Packaging is then lost and there is a risk of staining nearby packages which will then no longer be able to be sold, giving rise to substantial loss.

The invention sets out to provide a device for the storage of liquid which has high hygienic qualities prior to use and during opening while at the same time being inexpensive and easy and clean to use.

The device, according to one aspect of the invention, is used for the storage of liquid, particularly capillary liquid, and comprises a container and a removable cap, the cap being of the type comprising a part for gripping and a part for stoppering capable of collaborating with a nozzle of the container, said nozzle forming a passage between a zone inside the container and the outside, a free end of the nozzle forming a liquid outlet orifice. The device comprises a means for keeping the liquid contained in the container axially away from the orifice of the nozzle when the cap is in the closed position.

Thus, sudden discharge of the liquid from the container at the time of opening when the pressure in the zone inside the container is higher than the pressure outside, the container being partially filled with liquid and partially filled with gas, is prevented. The liquid is kept away from the orifice of the nozzle.

Advantageously, means are provided for fixing the cap onto the container and the cap comprises means for allowing the pressure in the zone inside the container and the pressure outside to be balanced upon opening

before the means for fixing the cap onto the container are deactivated. This arrangement allows the container to be depressurized before the liquid it contains is poured out.

Advantageously, the cap comprises a part extending roughly between the orifice of the nozzle and an opposite end of said nozzle in communication with the zone inside the container, in the closed position. In other words, said part extends from a closed end of the stopper to an open opposite end and may or may not extend beyond said open end. The liquid cannot remain in the nozzle before opening, thus reducing the risk of it splashing when the cap is opened.

As a preference, said part comprises at least one duct capable of placing the zone inside the container in communication with a zone delimited by the cap and in communication with the outside. The duct, of small cross section, allows the passage of gas but slows the passage of liquid.

In one embodiment of the invention, said part comprises at least two tabs capable of at least partially stoppering the nozzle. Partial stoppering of the nozzle prevents or at least reduces the formation of a drop of liquid which is ready to squirt out upon opening. The duct may be formed between the tabs. The tabs may be of different lengths than one another. The free ends of the tabs may be flat, pointed or rounded. The tabs may be separated by at least one slot. Slots may be of different lengths than one another.

In one embodiment of the invention, the tabs are of a length approximately equal to that of the nozzle. The amount of liquid near the nozzle is therefore extremely small and is generally in the form of a thin film.

In another embodiment of the invention, the tabs are of a length appreciably longer than that of the

nozzle and project into the zone inside the container in the closed state. The amount of liquid near the nozzle is again extremely small and is generally in the form of a convex drop of small size at the end of the tabs.

In another embodiment of the invention, the part extending roughly between the orifice of the nozzle and an opposite end of said nozzle in communication with the zone inside the container conforms in terms of shape to the interior surface of said nozzle. The stoppering part may be designed either to collaborate with a free end of the nozzle or to collaborate with an end of the nozzle near the zone inside the container.

In one embodiment of the invention, the pressure-balancing means are capable of passing through some liquid held in the nozzle by capillarity.

The device may comprise a tube of a length longer than that of the cap, arranged inside said cap and opening at one end near the orifice of the nozzle in the closed position and, at the other end, in the zone inside the container.

The invention also provides a removable cap for a container used for the storage of liquid, particularly capillary liquid. The cap is of the type comprising a part for gripping and a part for stoppering capable of collaborating with a nozzle of the container. The nozzle forms a passage between a zone inside the container and the outside, a free end of the nozzle forming a liquid outlet orifice. The cap comprises a means for keeping the liquid contained in the container away from the orifice of the nozzle when the cap is in the closed position.

If a drop of liquid is present near the cap, said drop is moved away from the nozzle, which allows the container to be depressurized without the splashing of liquid liable to spread out on surfaces outside the container, on a user's hands, clothing, etc. Depressurization may be effected by withdrawing gas under

the drop of liquid.

The device, according to one aspect of the invention, is used for the storage of liquid, particularly capillary liquid, and comprises a container and a removable cap. The cap is of the type comprising a part for gripping and a part for stoppering capable of collaborating with a nozzle of the container, said nozzle forming a passage between a zone inside the container and the outside. A free end of the nozzle forms a liquid outlet orifice. The device comprises a liquid-tight means for keeping said liquid axially away from the outlet orifice and which is gas-permeable.

The device, according to one aspect of the invention, is used for the storage of liquid, particularly capillary liquid, and comprises a container and a removable cap. The cap is of the type comprising a part for gripping and a part for stoppering capable of collaborating with a nozzle of the container, said nozzle forming a passage between a zone inside the container and the outside. A free end of the nozzle forms a liquid outlet orifice. The device comprises a means for spreading, by adsorption, some of the liquid away from the orifice of the nozzle when the device is opened.

The device may comprise surfaces on which liquid spreads out at the time of depressurization. The device may further comprise surfaces on which liquid spreads out during the opening movement.

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means capable of withdrawing gases contained in the device, the liquid remaining kept in said device.

As a drop of liquid generally forms near the outlet orifice, the gas communication means is capable of withdrawing gas elsewhere, particularly beyond the drop, for example under the drop, with the container in its normal position, cap uppermost. Withdrawing gas from some distance away from the drop, particularly a radial and/or axial distance away, makes it possible to avoid splashing.

Provision may be made for the re-capping of the container after initial opening by the user to be prevented or at the very least impeded.

The cap, according to one aspect of the invention, is intended to removably stopper an opening in communication with a reserve of product formed inside a container, said cap comprising mechanical means of attachment capable of collaborating with complementary means of attachment belonging to the reservoir or to an intermediate element mounted on said reservoir. Said cap comprises means capable, when said cap is in the non-fitted position, of opposing the fitting of the cap on said opening.

Thus, a user finds himself prevented from re-capping the container with the cap, which constitutes very strong encouragement to dispose of said container, which is desirable in the case of products likely to degrade after opening and after they have been subjected to the ambient atmosphere.

Advantageously, said means comprise elastically deformable means which, when the cap is in the fitted position, are engaged inside said opening, said elastically deformable means being such that when the cap is in the non-fitted position they at least partially delimit a cross section greater than an interior cross section of said opening.

Said elastically deformable means, in the free state after opening, exhibit a cross section larger than the diameter of the opening and cannot normally enter said opening which is generally of roughly cylindrical or very slightly frustoconical shape.

Advantageously, the cap comprises a side wall, a first end of which is plugged by a transverse wall, and a second end of which is open.

As a preference, the elastically deformable means are formed of at least two tabs arranged at least partially inside the side wall and secured to the transverse wall. The tabs may be integral with the rest of the cap.

In one embodiment of the invention, the tabs are oriented roughly along a longitudinal axis of the side wall.

In one embodiment of the invention, said cross section of the tabs, greater than an interior cross section, is formed at least partially of a free end of said tabs.

Advantageously, said tabs project with respect to the side wall.

In one embodiment of the invention, said tabs are separated from one another by slots.

The tabs may be of different lengths than one another. The free ends of the tabs may be flat, pointed or rounded. The tabs may be separated by at least one slot. Slots may be of different length than one another. Slots may extend as far as the transverse wall. Slots may be short and end roughly even with the free end of the side wall.

In another embodiment of the invention, the elastically deformable means are formed of at least one skirt arranged at least partially inside the side wall and secured to the transverse wall.

In another embodiment of the invention, said tabs

are secured to the side wall.

The cap may be made of a single piece by molding. The container may also be made of a single piece by molding.

It can thus be seen that the cap is easy and economical to manufacture, carries no risk of inadvertent opening during stages of handling, and is easy and clean to open.

The present invention will be better understood upon studying the detailed description of a number of entirely nonlimiting exemplary embodiments illustrated by the appended drawings, in which:

Figure 1 is a view in axial section of a container according to the invention;

Figure 2 is a view in section on II-II of figure 1;

Figures 3 to 6 are variants of figure 1;

Figures 7 to 12 show the stages of fitting the cap on the bottle;

Figure 13 is a view in section on XIII-XIII of figure 12;

Figures 14 to 17 show the steps of opening the container; and

Figure 18 is a view in axial section of another embodiment of the invention.

As can be seen in the figures, the bottle comprises a bottle body 1 and a cap 2. The body 1 is made of glass or molded synthetic material and, for example, has a frustoconical overall shape, for example of round, oval or some other cross section, and ends near the top in a shoulder 3 surmounted by a nozzle 4 of very slightly frustoconical shape.

The nozzle 4 has an upper edge 5 forming its free end, its other end connecting to the shoulder 3. The nozzle 4 is hollow and thus forms a passage 6 placing the inside 1a of the body 1 in communication with the

outside. An outlet orifice 7 of flat circular shape is formed at the upper end of the passage 6 in the same plane as the upper edge 5 of the nozzle 4. A male screw thread 8 is formed on the outer surface 4a of the nozzle 4.

The cap 2 comprises a skirt-shaped side wall 9 which is very slightly frustoconical so that its shape conforms to that of the nozzle 4. The cap 2 further comprises a flat circular upper wall 10 closing the upper end 9a of the side wall 9. The lower end 9b of the side wall 9 is open. The interior surface 9c of said side wall 9 is equipped with a female screw thread 11 capable of collaborating by screwing with the male screw thread 8 of the nozzle 4. The side wall 9 forms a part for gripping. The upper wall 10 forms a part for stoppering.

Formed on the lower surface 10a of the upper wall 10 on the same side as the side wall 9 is a relatively sharp sealing rim 12 of circular shape and of a diameter corresponding to that of the edge 5 so that, in the closed state, said sealing rim 12 is in sealed contact with the upper edge 5 of the nozzle 4.

Sub C7 The cap 2 comprises three elongate tabs 13 attached at their upper end to the lower surface 10a of the upper wall 10 inside the sealing rim 12. Each tab 13 extends downward inside the side wall 9. The lower end 14 of each tab 13 protrudes beyond the side wall 3 axially opposite the upper wall 10, extending axially as in the direction of the axis of the cone frustum formed by the side wall 9.

Each tab 13 is in the shape of an arc of a circle in cross section and is separated from the adjacent tabs 13 by a slot 15 which extends along the entire length of the tabs 13. By way of variation, it could be contrived for one or more slots 15 to extend only over part of the length of the tabs 13 starting from their lower end 14. However, it is appropriate to keep one of the slots 15

extending up close to the upper wall 10 for a reason which will be explained hereinafter.

Defined between the tabs 13 is a duct 16 extending over the entire length of said tabs 13, although, here again, it could be contrived for it to extend only over part of their length, starting from their lower end 14.

In figure 1, it can be seen that the cap 2 is separate from the body 1. The tabs 13, which are relatively supple in the transverse direction, are therefore depicted in the free state. In this free state, their lower ends 14 can be inscribed inside an imaginary circle, the diameter of which is greater than that of the orifice 7 of the nozzle 4. Thus, a user who has unscrewed the cap 2 and completely removed it from the nozzle 4 will have great difficulty in refitting the cap 2 on said nozzle 4 because the ends 14 of the tabs 13 occupy a greater diameter than that offered by the orifice 7 of the passage 6. The user is therefore greatly encouraged not to re-cap the container using the cap 2.

In the variant illustrated in figure 3, the tabs 13 are longer than in figure 1 which, for constant elasticity of the material of which they are formed, allows their lower ends 14 to separate further, making any attempt at re-capping with the cap 2 even more difficult.

By contrast, in the variant illustrated in figure 4, the lower ends 14 of the tabs 13 are roughly flush with the lower end of the side wall 9 while, of course, having a separation such that they cannot, in the free state, enter the orifice 7. This variant is particularly advantageous if there is a fear that a user might try to close the container again using the cap 2 using an implement such as a blade or pincers to hold the lower ends 14 of the tabs 13 together. The lower ends 14 of the tabs 13 are chamfered, being shorter on their

inner radial edge than on their outer radial edge. Thus, during any possible attempt at re-capping the container, if the end of a tab 13 comes into contact with the upper edge 5 of the nozzle 4, the tab 13 will tend to slip radially outward and therefore out of the orifice 7.

In the variant illustrated in figure 5, the cap 2 comprises a single tab 17, but one whose lower part splits into a number of branches 18 diverging from one another downward in such a way that they have lower ends 19 similar to the lower ends 14 of the variants described hereinabove. It would also be possible to envision a tab 13 and a tab 17 with two branches 18, or alternatively two tabs 17 with two branches 18.

In the variant illustrated in figure 6, the cap 2 comprises tabs 13 of very short length, markedly shorter than the axial length of the cap, and between which a dip tube 26 is push-fitted. The dip tube 26 is of cylindrical overall shape with an upper end 26a formed at an angle and arranged in the duct 16 between the tabs 13, and a lower end 26b beyond the lower end 9b of the side wall 9. Thus, in the closed state, the lower end 26b of the tube 26 is arranged not in the passage 6 but in the zone 1a inside the bottle body 1. Upon opening, once the seal formed between the rim 12 and the upper edge 5 of the nozzle 4 has been broken, and before the screw threads 8 and 11 fully disengage, the gases at a raised pressure in the zone 1a inside the bottle body 1 escape, passing up the inside of the tube 26 then through one or more of the slots 15 that separate the tabs 13 then dropping back down between the nozzle 4 and the side wall 9. The upper end 26a cut at a chamfer guarantees communication between the inside of the tube 26 and at least one of the slots 15. If there is a drop of liquid in the passage 6, then the decompression of the gases prior to the disengagement of the screw threads 8 and 11 guarantees there will be no splashing thanks to the

equalizing of the internal and external pressures. When the bottle is in the normal closed position, the cap 2 uppermost, the lower end 26b of the tube 26 has to be situated at a level between the top surface of the liquid contained in the bottle body 1 and the drop or part of liquid which, by capillarity, is likely to stagnate in the passage 6 of the nozzle 4. Degassing is thus allowed, without liquid escaping.

In a variant, it would also be possible to envision for the tabs 13, occupying a small radial space, to be arranged inside the tube 26, the upper end 26a of which would still be cut at a chamfer to allow gas communication.

The steps of capping the container are illustrated in figures 7 to 12. These capping steps take place in the production unit of the manufacturer of the product in question and are not materially within the competence of the consumer, at his home.

In figure 7, it can be seen that the cap 2 is offered up over the bottle 1, the tabs 13 being in the free state. Then, through a downward axial movement, the cap 2 is brought closer to the orifice 7 of the nozzle 4, see figure 8. Using a tool 20, the tabs 13 are brought closer together so that they can be inscribed in an imaginary circle of a diameter smaller than that of the opening 7 of the passage 6, see figure 9. The tool 20 may be in the form of a number of fingers, at least one per tab 13 or per branch 18, capable of moving each tab 13 or branch 18 radially inward. The fingers of the tool 20 may be in a form resembling the aperture of a piece of photographic equipment so as to push the tabs 13 closer together irrespective of their number.

In figure 10, it can be seen that once the tabs 13 have been brought closer together by the tool 20, the downward axial movement of the cap 2 is continued by

offering the end 14 of the tabs 13 into the orifice 7 and causing said ends 14 to enter it slightly.

In figure 11, it can be seen that the tool 20 is withdrawn, the tabs 13 being held in the upper part of the passage 6. The downward axial movement is then resumed until such time as the screw threads 8 and 11 are in mutual engagement. The cap 2 is turned to cause screwing until complete and leaktight stoppering is achieved as illustrated in figure 12.

The ends 14 of the tabs 13 then project into the body 1 below the shoulder 3.

The way in which the device works on opening is illustrated in figures 14 to 17. When the container is at least partially filled with liquid, a drop 21 of said liquid generally remains near the shoulder 3 because of the phenomenon of capillarity. In the case of a hair-dye applicator, the drop 21 is formed practically in all instances insofar as the user shakes the container with a view to mixing the two components. Reference may be made to document EP-A-0 528 707 for a fuller description of a two-compartment packaging. The volume of the drop 21 will of course depend on the physico-chemical characteristics of the liquid, such as its viscosity, its surface tension, its hydrophilic nature, etc.

In the case of a conventional cap with no tabs 13, the drop is formed in the upper end of the cap, in direct contact with its upper wall, and may occupy a large proportion of the passage in the nozzle.

As can be seen in figure 14, with the cap 2 according to the invention, the drop 21 is formed under the shoulder 2 and under the tabs 13. By virtue of the invention, the drop is kept axially away from the orifice 7.

When the cap 2 is unscrewed as illustrated in figure 15, said cap 2 moves upward slightly, which causes

the sealing rim 12 to separate from the upper edge 5 of the nozzle 4 and breaks the seal.

Subc2 If gases at a raised pressure with respect to the ambient atmosphere at the time of opening are located inside the body 1 of the container, they will escape through the slots 15 and/or through the duct 16 formed between the tabs 13, then pass through the slots 15 formed between the tabs 13 near the upper wall 10, then escape between the screw threads 8 and 11. As most of the volume of the drop 21 is in a zone lying radially outside the ends 14 of the tabs 13, the escape of gases at a raised pressure carries only a small amount of liquid from the drop 21 into the duct 16. In addition, this very small amount of liquid tends, by capillarity, to remain in the slots 15 formed between the tabs 13, the radial dimensions of which are smaller than those of the duct 16. This very small amount of liquid can spread out over the free surfaces of the tabs 13 and of the interior surface of the passage 6 formed by the nozzle 5, which free surfaces define the slots 15 and the duct 16. The duct 16 will generally provide most of the surfaces for spreading out. The duct 16 furthermore forms a means for withdrawing gases away from the drop which is formed, in the most part, at a place which is radially and/or axially remote from the lower end of the duct 16 formed at the free end of the tabs 13. The free cross section via which the gases escape is small enough for no significant amount of liquid to escape through the outlet orifice during this stage. It is thus possible to withdraw gas without splashing liquid.

The depressurization phenomenon therefore occurs in the position illustrated in figure 15, in which the screw threads 8 and 11 are still in engagement, which holds the cap 2 on the body 1 and prevents it from being thrown off while at the same time allowing gases to escape. Once depressurization has taken place, the cap 2

continues to be unscrewed and is then taken off axially, the tabs 13 sliding in the passage 6 of the nozzle 4. The stoppering means formed, in this instance, by the tabs 13, greatly reduces the amount of space that the liquid can occupy in the passage 6, see figure 13.

Sub c3 In the position illustrated in figure 16, it can be seen that the remainders of the drop 21 tend to spread out on the wall of the passage 6, being carried along slightly by the tabs 13. During the opening movement, the surface area for spreading out of the drop increases gradually. This is because the tabs 13 leave an increasing part of the interior surface of the nozzle 5 free, which part extends between the level of the lower end of the tabs 13 in the closed state and their instantaneous level during said opening movement.

Sub c4 The interior surface of the nozzle 5 is, in the embodiment illustrated, slightly frustoconical, the orifice 7 having a diameter smaller than that of the base of the passage 6 near the shoulder. The tabs 13 are forced to move closer together during said opening movement, which reduces the cross section free for the liquid in the passage 6. In other words, the width of the slots 15 become smaller, which has a wringing-out effect, with some of the drop dropping back into the body 1.

At the end of the movement, the cap 2 is completely separated from the body 1, the ends 14 of the tabs 13 passing through the orifice 7. The tabs 13 then revert to their free shape, occupying transverse dimensions greater than those of the orifice 7, preventing the reuse of the cap 2 on the body 1, see figure 17. It can therefore be seen that the container can be opened without splashing liquid contained in the container, insofar as any drop of liquid there might be is kept away from the zones via which the gases at raised pressure can escape. In other words, the tabs 13 make it possible to get the gases at raised pressure from beyond

the drop 21 and allow them to escape once the seal has been broken and before the cap 2 and the body 1 have been completely separated, hence leading to extremely reliable and clean opening of the container. If the escape of gases leads to a small drop of liquid, this is spread out over surfaces provided for this purpose and which prevent splashing.

In the embodiment illustrated in figure 18, the tabs 13 have been replaced by a single protrusion 22 which occupies roughly the entire space formed in the nozzle 4, and lies flush with the lower surface 24 of the shoulder 25 which here needs to be of relatively large size in the radial direction with respect to the axis of the cap. This surface of the shoulder and the surface of the lower end 23 of the protrusion 22 offer a practically smooth surface over which no drop of liquid can form. In general, just a film of liquid of very small thickness will remain on this surface after the constituents of the dye have been mixed and shaken by the user. At the time of opening, the upward movement of the protrusion 22 will carry with it only a very small amount of liquid from the film which was formed, this quantity tending to spread out during the movement along the internal wall of the passage 6, which further reduces the amount likely to be splashed at the time of depressurization.

In this embodiment, the seal between the cap 2 and the body 1 can be formed either, as in the other embodiments, near the upper wall of the cap or, on the other hand, near the lower end 23 of the protrusion 22.

By virtue of the invention, there is available a cap and a container which are economical to manufacture and reliable and clean to use. The cap can be push-fitted or screwed on. The risk of splashing liquid contained in the container is eliminated in the case of normal use. In other words, there is, in at least part of the passage 6, a liquid-tight structure to prevent liquid from staying

in said part and which is gas-permeable so that the container can be depressurized. The combination of liquid-tightness and gas-permeability offers great advantages.

The cap may in addition be equipped with means preventing or at least very much impeding its reuse on the container, which guarantees single use of the product contained in the container by encouraging the user to dispose of said container after the first use. Finally, no additional parts are added either to the cap or to the container, which can both be formed as a single piece by molding.